Thesis Title	Performance of Optical Modulation Techniques and Convolution Codes	
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ABSTRACT

This thesis studies performance of optical modulation scheme such as On-Off Keying, Pulse Position Modulation, Binary Pulse Position Modulation, Multi-pulse Pulse Position Modulation, Overlapping Pulse Position Modulation and Differential Pulse Position Modulation in Additive White Gaussian Noise (AWGN) and Poisson Channel. Each optical modulation and their bit error probability are designed with MATLAB. Results show a bit error probability and average photons per slot in Poisson channel or signal to noise ratio in AWGN channel. The comparison between each optical modulation scheme is done on throughput and the number of slots. Results show that developed techniques reduce the bit error probability more than that of original modulation technique. Moreover, Convolution Codes is combined with each optical modulation scheme. In order to improve system bit error rate, their performance depends on generator matrix, code rate and constraint length. Besides, the 4-level Photon Communication is studied and developed to a new modulation format called 4-level Photon Communication with Binary Pulse Position Modulation (BPPM). Two decision formats, estimation method and calculation method are proposed. Furthermore, the three techniques are utilized in combination with Convolution Codes. Hence, 2-level Photon Communication with BPPM, 4-level Photon Communication with BPPM and Punctured Convolution Codes with increasing a photon level are proposed. Results shown that each technique improves the bit error probability. Finally, it is concluded that 4-level Photon Communication with BPPM techniques reduce the bit error rate with better performance than without BPPM.